REMARKS

Applicants are amending their claims in order to further define various aspects of the present invention. Specifically, Applicants are adding new claims 30 and 31 to the application. Claims 30 and 31, dependent respectively on claims 1 and 25, recite that the compound having the borazine skeleton is a polymer having the borazine skeleton. Note, for example, claim 14.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action dated April 7, 2008, that is, the teachings of the U.S. patent documents to Mercer, et al, Patent No. 5,179,188, to Kirner, et al, Patent Application Publication No. 2003/0224156, to Motegi, et al, Patent No. 5,115,069, and to Kobayashi, et al, Patent No. 6,376,601, the Abstract of the article by Inoue, et al, published in the Proceedings of the Symposium on Semiconductors and Integrated Circuits Technology, 2002, Vol. 63, page 96-101, and the Abstract of the article by Uchimaru, et al, entitled "Evaluation of Low-k Polymer Film Containing Borazine-unit", in Extended Abstracts (the 48th Autumn Meeting 2001) of The Japan Society of Applied Physics (reference hereinafter is to the corresponding article by Uchimaru, et al, with the aforementioned title), under the provisions of 35 USC 103.

It is respectfully submitted that the teachings of the references as applied by the Examiner would have neither disclosed nor would have suggested such an insulating film as in the present claims, or such an electronic part formed using such insulating film, as in the present claims, including, inter alia, wherein the insulating film consists essentially of a compound having a borazine skeleton and having, inter alia, a Young's modulus of at least 5 GPa, with the insulating film being formed from

a borazine-based composition with a metal impurity content of no greater than 30 ppm, the compound, of which the insulating film consists essentially, having a repeating unit as in each of claims 1 and 25.

Furthermore, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such an insulating film as in the present claims, having features as discussed in connection with claims 1 and 25, and, moreover, wherein the compound has a leak current of no greater than 1×10^{-8} A/cm^2. See claim 1.

More specifically, the teachings of the applied references would have neither disclosed nor would have suggested such insulating film as in the present claims, having features as discussed in connection with claims 1 and 25, and wherein the compound having the borazine skeleton is a polymer having such borazine skeleton. See claims 30 and 31.

In addition, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such an insulating film as in the present claims, having features as discussed previously in connection with claims 1 and 25, and, moreover, wherein the metal impurity content of the resin composition is no greater than 10 ppm. See claim 2; note also claim 26.

Furthermore, it is respectfully submitted that these applied references would have neither taught nor would have suggested such a process for production of a borazine-based resin as in the present claims, wherein the process includes polymerizing a specified borazine compound and a hydrosilane in the presence of a solid catalyst, with the solid catalyst being removed after completing the step of polymerizing (see claim 8), particularly wherein the solid catalyst is a supported catalyst comprising a catalyst supported on compound-based carrier (see claim 9);

and/or wherein the process includes a step of adding to a polymerization system including a specified borazine compound and a hydrosilane in the presence of a metal catalyst in a polymerization solvent, a particulate scavenger which is insoluble in the polymerization system and adsorbs the metal component from the metal catalyst, after completion of polymerizing the specified borazine compound and hydrosilane, with the process including a further step of filtering out the scavenger to which the metal component has been adsorbed after addition of the scavenger (see claim 10).

Moreover, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such an insulating film as in the present claims, formed using a compound with a borazine skeleton, and wherein the compound with a borazine skeleton is produced by a process as discussed previously. Note claims 21-24.

Furthermore, it is respectfully submitted that these applied references would have neither disclosed nor would have suggested such insulating film or such resin composition, or such process, as in the present claims, having features as discussed previously, and, additionally, wherein the borazine compound and/or hydrosilane utilized in forming the compound having a borazine skeleton in a molecular structure thereof (borazine-based resin) are those materials as set forth in claims 11, 12, 28 and 29.

In addition, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such a borazine-based resin composition as in the present claims, including the repeating unit of the recited polymer, and wherein the composition further includes a solvent capable of

dissolving the polymer and has a solid concentration of 0.5 wt% or greater and a metal impurity content of no greater than 30 ppm. Note claims 13 and 14.

Moreover, even assuming, arguendo, that the teachings of the applied references would have established a prima facie case of obviousness, it is respectfully submitted that the evidence of record, including the Declaration of H. Matsutani submitted with the Amendment filed February 7, 2008, establishes unexpectedly better results achieved according to the present invention, and overcomes any such prima facie case of obviousness. In this regard, and as will be established infra, the evidence of record shows unexpectedly better results in reduced impurity, reduced leak current and reduced specific dielectric constant with improved Young's modulus, of structures and using processes according to the present invention, overcoming any possible prima facie case of obviousness established by the teachings of the applied references.

The invention as being claimed in claims rejected in the above-identified application is directed to a process for production of a borazine-based resin, a borazine-based resin composition, an insulating film including a compound (polymer) having a borazine skeleton, and electronic parts including such insulating film.

As described on page 1 of Applicants' specification, with miniaturization, increased output and faster signal speeds of communication devices in recent years, this had led to the need for greater flattening of films by chemical mechanical polishing; and increasing demands of greater heat resistance, mechanical properties, hygroscopicity, adhesion, moldability and high etching selection ratios, and particularly a low specific dielectric constant, for the insulating films. Efforts have been actively directed toward achieving lower dielectric constants and shorter

heat treatment steps, as well as greater heat resistance and mechanical properties of the electronic part insulating materials.

Porous materials, with pores in the films, have been proposed as insulating film material, with research being actively progressing towards their application for LSI interlayer insulating films. Another low dielectric constant material is borazine, which is known to have a lower calculated dielectric constant than benzene, and thin films thereof are also known to have high heat resistance.

However, as described on page 2 of Applicants' specification, when utilizing materials with pores, for insulating films, such films tend to exhibit lower film strength with lower dielectric constant, and, disadvantageously, peel off from desired surfaces during chemical mechanical polishing.

In addition, as described in paragraph [0008] on page 3 of Applicants' specification, in connection with a description of the present invention, the platinum catalyst remains as an unavoidable impurity in borazine-containing silicone polymer thin films produced by simple coating of a solution comprising a mixture of B,B',B''-trialkynylborazine compound and a hydrosilyl group-containing silicone compound in the presence of a platinum catalyst, and the metallic impurity can cause leak current and reduce or impair the performance of the insulating film.

Against this background, Applicants provide an insulating film of a compound having a borazine skeleton, with specified properties; borazine-based resin compositions used in forming the insulating film; and processes of forming the compositions and insulating film, as well as electronic parts formed using the insulating film, avoiding problems in connection with proposed techniques discussed previously. According to the present invention, the insulating film achieves reduced leak current by accomplishing reduced metal impurity content in the formed resin

composition and insulating film, thereby having only minimal generation of leak current, while having excellent mechanical strength and improved reliability with excellent specific dielectric constant and Young's modulus. Applicants have found that by forming the insulating film from a borazine-based resin composition with a metal impurity content of no greater than 30 ppm, leak current can be adequately reduced, e.g., to a level as in claim 1, providing an insulating film with unexpectedly improved insulating properties (e.g., reduced leak current) while avoiding a reduction in mechanical properties and achieving a reduced specific dielectric constant. Thus, with a Young's modulus as in the present claims, excellent mechanical properties are achieved, and the insulating film is highly suitable for flattening steps. Note, in particular, paragraphs [0013]-[0015] on pages 4 and 5 of Applicants' specification.

In addition, Applicants provide specific procedures achieving reduced metal impurity content, providing unexpectedly better results of the present invention. As shown by evidence of record, it is respectfully submitted that not all techniques for removing metal impurity content achieves levels and results as in the present claims. In this regard, attention is respectfully directed to the aforementioned Declaration of H. Matsutani. In Production Example 1-6 thereof, a metal impurity reduction technique is utilized, i.e., a known reprecipitation method is used, to form a borazine-based resin composition. Note Item 4 of this Declaration; note the specifics of the reprecipitation, described in Item 5 of this Declaration. As seen in Tables A and B respectively in Items 7 and 8 of this Declaration, platinum concentration of the resin composition 1-6 is higher than that of the present invention (compare with Production Examples 1-1 through 1-4 in Table 1 on page 69 of Applicants' specification); and specific dielectric constant, leak current and Young's modulus of insulating film 1-6 reported in the Declaration do not achieve values as achieved in the present

invention. It is respectfully submitted that this evidence in the aforementioned Declaration, and the evidence in the experimental data on pages 64-71 of Applicants' specification, including particularly Tables 1 and 2, show unexpectedly better results achieved according to the present invention, with respect to the processing used and product formed, further supporting a conclusion of unobviousness of the presently claimed subject matter.

In connection with the aforementioned Declaration of H. Matsutani, the contention by the Examiner in the paragraph bridging pages 5 and 6 of the Office Action mailed April 7, 2008, that such Declaration is "not all useful as a means for overcoming the prior art rejections of record", because the Declaration "does not compare that which is taught by the proposed combinations with [Applicants' invention]", is respectfully traversed. It is respectfully submitted that the Examiner is requiring Applicants to compare the present invention with what the Examiner regards to be the present invention (that is, the proposed combinations of references.) It is respectfully submitted that this requirement for comparison by the Examiner is improper, under the guidelines of Manual of Patenting Examining Procedure (MPEP) 716.02(e), sub-heading III, stating that Applicants are "not required to compare the claimed invention with subject matter that does not exist in the prior art". It is respectfully submitted that the Examiner is requiring Applicants to compare the claimed invention with the subject matter that does not exist in the prior art, that is, the proposed combinations. Such requirement is clearly improper.

Contrary to the contention by the Examiner, and in connection with purification of polymers, it is respectfully submitted that the aforementioned Declaration provides a comparison with the closest prior art, that is, re-precipitation. In this regard, even assuming, arguendo, that the teachings of the applied references disclose

purification of produced polymer material with respect to the catalyst (as will be shown infra, it is respectfully submitted that the teachings of the applied references do not teach, nor would have suggested, purification of polymer), it is respectfully submitted that the references provide no distinction between, for example, purification by a known reprecipitation method, as compared with a technique within the scope of the present claims. In contrast, the aforementioned Declaration shows unexpectedly better results achieved by the presently claimed purification technique. Even assuming, arguendo, that the teachings of the applied references would have established a prima facie case of obviousness, such prima facie case is overcome by the evidence of the aforementioned Declaration, and further overcome by evidence in Applicants' specification referred to previously, showing unexpectedly better results achieved according to the present invention.

The article by Uchimaru, et al reports on an evaluation of relative dielectric constant of borazine compounds having six-membered ring structures composed of boron and nitrogen, the synthesized polymer compound containing a borazine unit. The evaluated borazine compound was formed by subjecting B, B', B"-triethynyl-N,N',N"-trimethylborazine (1) and p-bis (dimethylsilyl) benzene (2) to addition polymerization, in an ethylbenzene solvent in the presence of a platinum catalyst. The resulting solution was coated on a silicon wafer by using a spin coater. Relative dielectric constant was measured. In the borazine-carbosilane-based polymer, the relative dielectric constant at one MHZ was 2.5. This article reports that introduction of the borazine unit enabled a decrease in the relative dielectric constant.

The Abstract of Inoue, et al discloses organic/inorganic hybrid polymers containing borazine units, and that such polymers can be synthesized by hydrosilylation polymerization of borazine compounds such as B,B',B"-triethynyl-

N,N',N''-trimethyl-borazine with silicone compounds such as tetramethylcyclosiloxane, with thin homogenous films of the linear polymer being formed on a silicon wafer by a spin-coating method, followed by annealing at 200-500°C under argon gas. This Abstract discloses that the dielectric constants of these thin films were evaluated to be 2.8-2.2. This Abstract further discloses that the polymer thin film can be used as a hard mask for a low-k organic polymer interlayer dielectric, which can result in the total interlayer insulator with effective dielectric constant of 2.7.

It is respectfully submitted that neither of Uchimaru, et al, or of Inoue, et al, would have disclosed or would have suggested the presently claimed invention, including, inter alia, reducing metal impurity to levels as in various of the present claims, by steps, e.g., of removing the solid catalyst after the polymerizing, or of using the particulate scavenger, or of using a catalyst supported on a compound-based carrier, and advantages thereof as discussed in the foregoing. It is respectfully submitted that without removal of the platinum catalyst as provided in the present invention, to levels as in the present claims, the properties of specific dielectric constant, and/or Young's modulus, and/or leak current, recited in the present claims would not be achieved by the film of Uchimaru, et al, or by the film of Inoue, et al.

It is respectfully submitted that the article by Uchimaru, et al is silent on Young's modulus and leak current of the film; and, moreover, the description in Uchimaru, et al is silent with respect to insulating properties of the film. Clearly, this reference would have neither disclosed nor would have suggested the presently claimed subject matter, including Young's modulus and/or leak current, and/or

reduction of metal impurity to levels as in the present claims, and advantages due thereto, as discussed in the foregoing.

Similarly, it is respectfully submitted that Inoue, et al is silent with respect to Young's modulus and leak current of the film, which are features of the present invention. Further, it is respectfully submitted that Inoue, et al is silent in connection with an insulating property of the film. Moreover, the Inoue, et al Abstract applied by the Examiner is silent in connection with removal of catalyst. It is respectfully submitted that the teachings of this Abstract of Inoue, et al is deficient with respect to features of the present invention including properties such as Young's modulus and/or leak current, or reducing metal impurity concentration to levels as in the present claims, including processing steps for removing the catalyst, and advantages achieved by the present invention.

It is respectfully submitted that the teachings of the secondary references applied by the Examiner, Kirner, et al or Mercer, et al, and Motegi, et al or Kobayashi, et al, even together with the teachings of either of Uchimaru, et al, or of Inoue, et al, would have neither disclosed nor would have suggested the presently claimed invention, including, inter alia, Young's modulus, metal impurity content and leak current, or removal of metal of the catalyst as in various of the present claims, and advantages due thereto.

In particular, and as will be discussed further in the following, it is respectfully submitted that Kirner, et al, Mercer, et al, Motegi, et al, and Kobayashi, et al, disclose technologies that remove impurities in the synthesis of specific, relatively low-molecular weight compounds. It is respectfully submitted that one of ordinary skill in the art concerned with in Uchimaru, et al, and Inoue, et al, concerned with borazine-

containing polymers, would not have looked to the teachings of the applied secondary references.

That is, extension and bridge formation of polymer chains occur in a complicated manner in polymer synthesis. Using a catalyst in such synthesis in an effective amount, and then removing the catalyst, can lead to reduced reactivity and recovery rate. In contrast, and contrary to expectations, among various methods for synthesizing borazine-based resin, the technique specified in the present invention including removal of the metal component of the catalyst hardly has problems of, e.g., reduced reactivity, and the present invention achieves an insulating film with excellent characteristics as shown in the aforementioned Declaration. Noting especially again that the secondary references (Kirner, et al, Mercer, et al, Motegi, et al, and Kobayashi, et al) relate to specific, relatively low-molecular weight compounds, it is respectfully submitted that one of ordinary skill in the art would not have looked to these references in connection with the specified polymer of the primary references of Uchimaru, et al, and of Inoue, et al.

However, even assuming, arguendo, that the teachings of Kirner, et al, or of Mercer, et al, were properly combinable with the teachings of Uchimaru, et al, or of Inoue, et al, it is respectfully submitted that the combined teachings of these references would have neither disclosed nor would have suggested such an insulating film, or method of production thereof, the insulating film having, inter alia, low metallic impurity levels, and Young's modulus, as in the present claims, and/or leak current as in various of the present claims, and advantages due thereto.

Mercer, et al discloses crosslinkable fluorinated aromatic ether compositions which are useful as dielectric and protective materials in microelectronic articles, the compositions being described most generally from column 2, line 10 to column 3,

line 35. These compositions can be made by condensation of a diphenol with a fluorinated compound, as described in column 4, line 52 to column 5, line 10. This patent discloses that the compositions can be crosslinked, for example, by heating or irradiation to provide a solvent resistant material for electronic application. See column 4, lines 22-24. Note also column 9, lines 40-44. This patent discloses that dielectrics for electronic applications desirably contain low levels (generally less than 20 ppm) of ionic impurities, and that if a dielectric including a polymer is made by a synthetic route which requires the use of a transition metal reagent or catalyst, the effective removal of transition metal residues may be a difficult task; and that an advantage of the oligomers in this patent is that they can be made and subsequently cured by a route which does not involve transition metal species, and the potassium (or sodium) carbonate reagent and potassium (or sodium) fluoride by-product can be easily removed. Note column 10, lines 42-53.

Note that Mercer, et al is directed to avoiding the use of catalyst, disclosing that effective removal of transition metal residues "may be a difficult task". It is respectfully submitted that the teachings of this reference, in combination with the teachings of Uchimaru, et al, or of Inoue, et al, would have neither disclosed nor would have suggested the procedures for reducing metal impurity content as in the present claims, or reducing metal impurities where a catalyst is used in the polymerization step, much less the reduced level of metal impurity content or leak current according to the present invention and advantages thereof. Moreover, the combination of reference teachings as applied would have neither disclosed or suggested Young's modulus as in the present claims.

In fact, it is respectfully submitted that the combined disclosures of Uchimaru, et al (or of Inoue, et al) and of Mercer, et al, would have taught away from the

present invention, including use of the catalyst and removal thereof, it again being emphasized that Mercer, et al discloses to avoid catalyst.

Kirner, et al. discloses material suitable for use in electronic devices, describing, e.g., in paragraph [0013] on page 2, that it is desirable that the film has a controlled level of impurities; and that, in other words, the film should be deposited using ingredients that have minimal levels of nonvolatile impurities. In paragraph [0021] on page 3 of Kirner, et al, it is disclosed that the dielectric materials in this patent have a metal impurity level "of about 500 ppm or less".

Noting the relatively large amounts of impurity described in Kirner, et al, it is respectfully submitted that this reference, either alone or in combination with the teachings of Uchimaru, et al or of Inoue, et al, would have neither disclosed nor would have suggested the presently claimed subject matter, including level of impurity as in the present claims and/or leak current and/or removal techniques of the metal component of the catalyst, or Young's modulus, as in the present claims, and advantages due thereto.

For the following additional reasons, it is respectfully submitted that the combined teachings of either of Kirner, et al, or of Mercer, et al, with the teachings of Uchimaru, et al, or of Inoue, et al, would have neither disclosed nor would have suggested the presently claimed invention. Thus, paragraph [0013] of Kirner, et al states that the film should be deposited using ingredients that have minimal levels of non-volatile impurities; and that in the IC industry, it is well known that alkali metal ion such as sodium and potassium should be excluded. Paragraph [0014] of Kirner, et al goes on to state that the impurities may result from residual levels of catalyst used in the manufacture of the chemical precursory agents. Taking these teachings as a whole, it is respectfully submitted that these statements relate to components

which will become materials for the insulating film, and refer particularly to alkali metal ion impurities.

Furthermore, paragraph [0068] of Kirner, et al discloses that the film therein is formed from a mixture comprising a film matrix material, a porogen and other additives that vary depending upon the formation process used. It is respectfully submitted that it can be understood from the description that the materials specifically described in Kirner, et al are ones for forming a silica film.

Considering the foregoing, it is respectfully submitted that Kirner, et al only discloses that the impurities referenced therein relate to materials of a silica film, for forming the insulating film. In other words, it is respectfully submitted that Kirner, et al, either alone or in combination with the teachings of other references as applied by the Examiner, would have either disclosed nor would have suggested the reduction of metal impurities in borazine resins as in the present invention, having a structure completely different from silica.

Similarly, in Mercer, et al, in column 10, lines 42-52, it is described that dielectrics for electronic applications desirably contain low levels of ionic impurity, and that if a dielectric comprising a polymer is made by a synthetic route which requires the use of a transition metal reagent or catalyst, the effective removal of transition metal residues may be a difficult task. Thus, it is respectfully submitted that Mercer, et al only indicates that removing metallic impurities when synthesizing the specific polymer therein using a metallic catalyst is difficult, and would have neither disclosed nor would have suggested any removal technique therefor, or any necessity of removing catalyst from polymers with a borazine skeleton, much less the technique as in the present invention, and unexpectedly advantageous results due thereto.

It is respectfully submitted that neither of Kirner et al, or Mercer, et al, either alone or in combination with the teachings of the other references applied by the Examiner in the last full paragraph on page 2, and in the paragraph bridging pages 2 and 3, of the Office Action mailed April 7, 2008, would have disclosed or would have suggested improving properties of the borazine resin by reducing metallic impurities therein; and is respectfully submitted that the combination of Kirner, et al, or Mercer, et al, with Uchimaru, et al or Inoue, et al, would have neither disclosed nor would have suggested the insulating film of the present invention, having low metallic impurities and Young's modulus, and leak current value, as in the present claims, or advantages due thereto.

It is respectfully submitted that the further teachings of Motegi, et al, and of Kobayashi, et al, as applied by the Examiner on pages 3 and 4 of the Office Action mailed April 7, 2008, would not have rectified the deficiencies of the combined teachings of Uchimaru, et al, or Inoue, et al, together with the teachings of Kirner, et al, or Mercer, et al, as applied by the Examiner, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Motegi, et al discloses glycidoxy group-containing organosilicon compounds useful for the modification of interfacial properties of synthetic resins such as epoxy resins, polyesters, polyurethanes, polyamides, polyimides, and the like produced by utilizing the reactivity of an epoxy group, hydroxyl group, carboxyl group and amino group, the glycidoxy group-containing organosilicon compounds being described most generally in column 1, line 66 to column 2, line 10 of this patent. A process for producing these compounds is described in column 2, lines 30-45, and includes subjecting a specified compound to a hydrosylylation reaction with a 1-end-hydrogenated diorganosiloxane oligomer in the presence of a catalyst such as a

platinum compound. This patent goes on to disclose that after completion of the reaction, low boiling point ingredients remaining unreacted are evaporation-removed under reduced pressure, and, if desired and necessary, the resulting product is subjected to active carbon treatment etc. to remove the hydrosilylation catalyst or to decolor the product. See column 4, lines 6-14.

Note that Motegi, et al only discloses use of active carbon treatment "if desired and necessary". It is respectfully submitted that the teachings of Motegi, et al, even in combination with the teachings of Uchimaru, et al or Inoue, et al, and the teachings of Mercer, et al or Kirner, et al, as applied by the Examiner, would have neither disclosed nor would have suggested the need for removing metal impurities from compositions as in the present invention, much less to a level as in the present claims, and advantages thereof, or Young's modulus and other properties as in the present claims, and advantages thereof.

Kobayashi, et al discloses high-refractive-index optical silicone oil, and a high-refractive index optical silicone oil mixture, the oil comprising a specified pentasiloxane having terminal alkyl groups, wherein the oil has a refractive index from 1.45 to 1.50 at 25ºC, and methods of making such oil and such mixture. Note column 1, line 55 through column 2, line 29. Note that this patent discloses that the silicone oil is prepared in the presence of a supported platinum catalyst. Note, further, column 1, lines 50-54, of Kobayashi, et al. This patent further discloses that the supported platinum catalyst can be, for example, Pt-on-carbon powder, Pt-on-silica micropowder or Pt-on-alumina micropowder, and the support will generally carry from 0.1 to 10 weight % platinum. This patent goes on to disclose that the supported platinum catalyst can be separated post-reaction by known methods, such

as filtration or centrifugal separation. See column 3, lines 23-28. Note also column 4, lines 58-65.

Note that with each of Motegi, et al, and Kobayashi, et al, the materials produced are of relatively low molecular weight. It is respectfully submitted that one of ordinary skill in the art concerned with in connection with the present invention, that is, polymers, in particular borazine-containing polymers, would not have looked to synthesis of low-molecular weight materials as in each of Motegi, et al., and of Kobayashi, et al.

In any event, even assuming, arguendo, that the teachings of these references were properly combinable, such teachings would have neither disclosed nor would have suggested the presently claimed subject matter, including the insulating film having low metallic impurities content and Young's modulus as in the present claims, and leak current value as in various of the present claims; or the presently recited method including removal of metal catalyst component, including specific techniques for such removal, with advantages due thereto as discussed previously.

The double patenting rejections, of claims 1-3 only, set forth on page 5 of the Office Action mailed April 7, 2008, are respectfully traversed, in view of the following. In connection with these double patenting rejections, the Examiner's attention is respectfully directed to the different Assignees of the above-identified application, of U.S. Patent No. 6,924,545, and of Application No. 10/809,704.

The applied claims of No. 6,924,545 are directed to a low-dielectric-constant interlayer insulating film and a semiconductor device using such film. It is respectfully submitted that the claims of the patent applied by the Examiner do not

set forth a specific dielectric constant or Young's modulus, or maximum leak current, or metal impurity content, as in the present claims, and advantages due thereto.

In the double patenting rejection using the subject matter claimed in Application No. 10/809,704, the Examiner has applied claims 13 and 20 of No. 10/809,704. Such reliance on claims 13 and 20 is not understood, in that No. 10/809,704 included claims 4-9, the only claims in the application, which have been allowed. See the Notice of Allowability enclosed with the Notice of Allowance mailed May 14, 2008, in No. 10/809,704.

In any event, it is respectfully submitted that the subject matter claimed in No. 10/809,704 would have neither disclosed nor would have suggested the subject matter of claims 1 and 2 of the above-identified application, including, inter alia, the Young's modulus and specific dielectric constant and leak current, and metal impurity content, as in the present claims, and advantages thereof.

It is respectfully submitted that neither of Kirner, et al or Mercer, et al, in combination with the subject matter claimed in No. 6,924,545 or Application No. 10/809,704, would have provided a suggestion of removing the metal catalyst from films as in the subject matter claimed in the respective patent and application. To emphasize, Kirner, et al is mainly concerned with polymers made from silica sources, and this kind of polymer is generally produced without a metal catalyst. Moreover, Mercer, et al is concerned with fluorinated polyethers, and does not relate to polymers as in the present invention. Furthermore, as discussed previously, Mercer, et al suggests that removing metal impurity content is a difficult task, and suggests avoiding catalysts. Particularly in view of these teachings of Kirner, et al and of Mercer, et al, it is respectfully submitted that the teachings thereof would have neither disclosed nor would have suggested, either alone or in combination with the

subject matter claimed in the respective applied patent and application, impurity content of the metal impurities as in the present claims, and advantages thereof, or other properties as in the present claims, including Young's modulus and advantages thereof.

The contention by the Examiner in the last five lines on page 6 of the Office Action mailed April 7, 2008, is noted. It must be emphasized that each of Motegi, et al, and of Kobayashi, et al, is directed to separation of catalyst from low-molecular-weight compounds. Noting again the relatively complex effects in removal of catalyst when forming a polymer by a polymerizing reaction, it is respectfully submitted that one of ordinary skill in the art concerned with Uchimaru, et al, or of Inoue, et al, would not have looked to the teachings of Mercer, et al, and of Motegi, et al.

The additional contention by the Examiner on page 7, lines 5-8, of the Office Action mailed April 7, 2008, that the Examiner has only cited Mercer, et al "as a means for supporting his contention that it was well-known that the exclusion of metal impurities from a dielectric composition was already recognized as being desirable", is noted. However, it must be emphasized that Mercer, et al teaches away from using a catalyst, in disclosing that "the effective removal of transition metal residues may be a difficult task". Moreover, Mercer, et al does not disclose, nor would have suggested, removal of such transition metal residues. It is respectfully submitted that the teachings of Mercer, et al, as a whole, in combination with the teachings of the other references as applied by the Examiner, would have neither taught nor would have suggested removal of platinum catalyst from an insulating film consisting essentially of a compound (e.g., polymer) having a borazine skeleton, to a metal impurity content level as in the present claims, or providing such insulating film having properties as in the present claims, and advantages thereof.

The contention by the Examiner in the first paragraph on page 7 of the Office Action mailed April 7, 2008, that the fact that Mercer, et al contemplates preparing the dielectric material in the absence of the catalyst "is immaterial because they disclose the use a completely different polymer where...a catalyst in its preparation" can be avoided, is noted. Thus, the Examiner admits that Mercer, et al is concerned with an entirely different technique, where a catalyst is unnecessary. It is respectfully submitted that, even as Mercer, et al has been interpreted by the Examiner, one of ordinary skill in the art concerned with in connection with the teachings of Uchimaru, et al, or Inoue, et al, would not have looked to the teachings of Mercer, et al, which discloses preparing their dielectric material in the absence of a catalyst.

The contention by the Examiner in the paragraph bridging pages 7 and 8 of the Office Action mailed April 7, 2008, that the Young's modulus or leak current recitation of the claims are properties that "are a function of polymer structure and the absence of metal impurities respectively", is noted. It is respectfully submitted that various factors, including, for example, molecular weight of the polymer, contribute to properties of the insulating film; and it is respectfully submitted that the Examiner has not established inherency, or that values of Young's modulus or leak current of the present claims would have been obvious, particularly in view of the advantages thereof as described in Applicants' specification and discussed previously.

Applicants respectfully traverse the conclusion by the Examiner in the first four lines on page 8 of the Office Action mailed April 7, 2008, without any evidence or reasoning in support thereof, that various characteristics for the present claims are identical to that when combining the applied references and "upon carrying out the

catalyst isolation techniques taught by [Kobayashi, et al, and Motegi, et al]". It is respectfully submitted that the Examiner has not established that the catalyst isolation techniques in Kobayashi, et al, and Motegi, et al, with respect to the other materials described therein, wherein compounds (polymers) having a borazine skeleton are not disclosed, will inherently have metal impurity content of no greater than that as in the present claims, much less the other properties such as specific dielectric constant, Young's modulus and leak current, and advantages thereof.

The contention by the Examiner on page 8 of the Office Action mailed April 7, 2008, that if the prior art teaches the identical chemical structure, the properties Applicants disclose and/or claim are necessarily present, is noted. It is respectfully submitted, however, that the present claims recite a compound (polymer) formed utilizing a catalyst, with a maximum amount of impurities content. It is respectfully submitted that the Examiner has not established that the prior art teaches the "identical chemical structure" of the insulating film as in the present claims, including, for example, molecular weight.

The undersigned notes with thanks the indicated allowance of claims 4-6, on page 8 of the Office Action dated April 7, 2008. As claim 7 is dependent on claim 4, it is respectfully submitted that claim 7 should also be allowed, based at least on the reasons that the Examiner has allowed claim 4.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of

Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1303.44954X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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